

# PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2001-251581

(43)Date of publication of application : 14.09.2001

---

(51)Int.Cl. H04N 5/91

---

(21)Application number : 2000-059663 (71)Applicant : JISEDAI JOHO HOSO  
SYSTEM KENKYUSHO:KK  
RICOH CO LTD

(22)Date of filing : 03.03.2000 (72)Inventor : HASHIMOTO TAKAKO  
YOSHIURA YUKARI  
IIZAWA ATSUSHI

---

(54) SPORTS VIDEO DIGEST PRODUCTION METHOD AND COMPUTER-READABLE RECORDING MEDIUM WITH PROGRAM FOR PERFORMING PRODUCTION METHOD VIA COMPUTER RECORDED THEREIN

(57)Abstract:

PROBLEM TO BE SOLVED: To produce digest images by extracting the video scenes of higher importance from those structurally ambiguous sports video scenes when a fragmentary video index is added to the structurally ambiguous sports images at a level where the real-time distribution is possible about these sports images.

SOLUTION: A first action index, i.e. the information showing the actions serving as breaks in video scenes is prepared together with a second action index, i.e. the information showing the actions of each attacking team or player and a 3rd action index, i.e. the information showing the actions that are related directly with the point scoring scenes are added as video indexes. Then the importance of video scenes are decided among those sports images by means of the 1st to 3rd action indexes and the video scenes of higher importance are extracted for producing the digest videos.

---

## CLAIMS

---

[Claim(s)]

[Claim 1] From a sport video image added as an index picture, fragmentary information explaining the contents of the image scene. In a sport video image digest preparation method which creates a digest image of an important image scene semantically using said index picture, the 1st index of operation that is the information which shows operation which serves as a pause of an image scene in

operation of the target sport as an index picture to said sport video image  
 The 2nd index of operation that is the information which shows operation of each team or a player who is performing attack operation in operation of the target sport  
 the 3rd index of operation that is the information which shows operation which is directly related to a score of the target sport is added at least -- further -- the [ said 1st / the / - ] -- an index of three of operation  
 It has the area information which divided into two or more area area where the target sport is performed as information which shows an applicable place at and defined it the [ said 1st / the / - ] -- a sport video image digest preparation method judging importance of an image scene in said sport video image using an index of three of operation  
 extracting an image scene with high importance and creating as a digest image.

[Claim 2] the [ said 1st / the / - ] when judging importance of an image scene in said sport video image using an index of three of operation  
 The section between the 1st index of operation added to said sport video image is defined as the play section (D) using said 1st index of operation  
 A value of "1" is set up when one team is performing attack operation in said play section (D)  
 When a team of another side of another side is performing attack operation define a team coefficient (T) as setting up a value of "0" and each area in in said play section (D) is pinpointed using said area information  
 With reference to a weighting factor (AP) beforehand set as each area it asks for a situation level parameter (Ps) with a following formula as an integral value of time when one team is performing attack operation  
 The sport video image digest preparation method according to claim 1 comparing a value of said situation level parameter (Ps) for every  $Ps = \int_0^T dt$  and (AP) dt play section and judging importance of an image scene per play section.

[Claim 3] Based on a value of said situation level parameter as a situation index which shows a situation of a game  
 On the other hand and the 1st situation index that shows an attack of a team of another side the 2nd situation index that reaches on the other hand and shows time earnings of a team of another side  
 The sport video image digest preparation method according to claim 2 wherein an attack of the 3rd situation index that shows intense offense and defense or both teams generates the 4th situation index that shows feeling-of-tension rarefaction with a low and adds it to an image scene of the applicable play section.

[Claim 4] furthermore -- beforehand -- the [ said 1st / the / - ] -- the [ a situation index of four said 1st / the / - ] -- combining an index of three of operation  
 Three kinds of importance judging parameters an attack level an agitation level and a user profile level are defined the [ the 1st added to each play section - ] -- the [ a situation index of four and the 1st - ] -- based on an index of three of operation  
 When calculating a value of three kinds of said importance judging parameter extracting an image scene with said high importance and creating as a digest image  
 The sport video image digest preparation method according to claim 3 extracting an image scene focusing on an expensive portion of said importance judging parameter.

[Claim 5] When extracting an image scene with said high importance and creating

as a digest image When said situation index is added to the play section where importance is high The sport video image digest preparation method according to claim 3 or 4 extracting an image scene which consists of continuation of the play section when the same situation index is added including the high play section of said importance.

[Claim 6] the [ said 1st / the / - ] when judging importance of an image scene in said sport video image using an index of three of operation Said 1st index of operation and the 3rd index of operation are used The section between the 1st index of operation added to said sport video image or the section between the 1st index of operation and the 3rd index of operation is defined as the play section the [ the 1st within said play section - ] -- the section between the 1st index of operation added to said play section using an index of three of operation and the 2nd index of operation. The section between the 2nd index of operation or the section between the 2nd index of operation and the 3rd index of operation is defined as the attack section the [ the 1st which computes time (t) when each team is performing attack operation for said every attack section and defines each attack section using said area information - ] -- area is shown by an index of three of operation [ pinpoint and ] With reference to a weighting factor beforehand set as each area determine a weighting factor (AP) of each index of operation and an index of both ends which define said attack section of operation is made into a start index and an end index respectively It asks for an attack situation level parameter (Ps) of each attack section with a following formula [Equation 1]

The sport video image digest preparation method according to claim 1 comparing a value of said attack situation level parameter (Ps) of each attack section and judging importance of an image scene per attack section.

[Claim 7] the [ said 1st / the / - ] when judging importance of an image scene in said sport video image using an index of three of operation Said 1st index of operation and the 3rd index of operation are used The section between the 1st index of operation added to said sport video image or the section between the 1st index of operation and the 3rd index of operation is defined as the play section the [ the 1st within said play section - ] -- the section between the 1st index of operation added to said play section using an index of three of operation and the 2nd index of operation. The section between the 2nd index of operation or the section between the 2nd index of operation and the 3rd index of operation is defined as the attack section the [ the 1st which computes time (t) when each team is performing attack operation for said every attack section and defines each attack section using said area information - ] -- area is shown by an index of three of operation [ pinpoint and ] With reference to a weighting factor beforehand set as each area determine a weighting factor (AP) of each index of operation and an index of both ends which define said attack section of operation is made into a start index and an end index respectively It asks for an attack move level parameter (Pb) of each attack section with a following formula [Equation 2]

The sport video image digest preparation method according to claim 1 comparing a value of said attack move level parameter (Pb) of each attack section and judging importance of an image scene per attack section.

[Claim 8] the [ said 1st / the / - ] when judging importance of an image scene in said sport video image using an index of three of operation Said 1st index of operation and the 3rd index of operation are used The section between the 1st index of operation added to said sport video image or the section between the 1st index of operation and the 3rd index of operation is defined as the play section the [ the 1st within said play section - ] -- the section between the 1st index of operation added to said play section using an index of three of operation and the 2nd index of operation. The section between the 2nd index of operation or the section between the 2nd index of operation and the 3rd index of operation is defined as the attack section the [ the 1st which computes time (t) when each team is performing attack operation for said every attack section and defines each attack section using said area information - ] -- area in shown by an index of three of operation [ pinpoint and ] With reference to a weighting factor beforehand set as each area determine a weighting factor (AP) of each index of operation and an index of both ends which define said attack section of operation is made into a start index and an end index respectively It asks for an attack situation level parameter (Ps) of each attack section and an attack move level parameter (Pb) of each attack section with a following formula [Equation 3]

The sport video image digest preparation method according to claim 1 characterized by judging importance of an image scene per attack section using said attack situation level parameter (Ps) of each attack section and an attack move level parameter (Pb).

[Claim 9] A recording medium recording a program for making a computer perform a sport video image digest preparation method of any one statement of said claim 1-8 and in which computer reading is possible.

---

## DETAILED DESCRIPTION

---

[Detailed Description of the Invention]

[0001]

[Field of the Invention] The fragmentary information explaining the contents of the image scene this invention from the sport video image added as an index picture. About the recording medium which recorded the program for making a computer perform a sport video image digest preparation method which creates the digest image of an important image scene semantically using an index picture and a method for the same and in which computer reading is possible more in details. It is

related with the sport video image digest preparation method and recording medium which create the digest image which expressed the contents of the game exactly from the sport video image which cannot add an index picture easily like [ the structure of a game is not clear and it is pacey and ] a soccer image with many cooperation plays.

[0002]

[Description of the Prior Art] In recent years digitization of broadcasting is progressing quickly on a worldwide scale and preparation of BS (Broadcast Satellite) digital broadcasting or land-based digital broadcasting is progressing steadily. The view forms of television also change rapidly by this and not only the conventional real-time viewing and listening but accumulated type viewing and listening and non-linear view forms become possible.

[0003] Here these people explain the digest preparing system in the non-linear view forms proposed so far. These people are first aimed at the image added as an index picture by supplementary information. In [ search the image scene assumed to be an important scene using that index picture devise the digest preparing system which creates the digest version (digest image) of an image and ] this digest preparing system since voice description is also included in the image scene judged to be an important scene it is said that it comes out enough only by generating the outline of a section index as an explanatory note -- it thought and came out and the explanatory note generation processing of image contents has been considered. When creating a digest image using an index picture the proposal of the digest preparation device which creates the digest image reflecting the taste of the televiewer (user) using an image is also performed. Adding the emotional expression for which it depended on a televiewer's taste to the search results of an image and the fragmentary explanatory note for every image scene are proposed by adding a connection expression also about the function considered as a natural expression.

[0004] The details of the above-mentioned art are clarified by following \*\* - \*\*.

\*\* Collection [ of Takako Hashimoto and other: "examination of digest viewing- and-listening method using program index" Institute of Image Information and Television Engineers broadcasting format study group drafts ] March 1999 and pp. 7-12.

\*\* Collection CD-ROM of Takako Hashimoto and other: "trial productions of digest creation method using program index" data engineering workshop (DEWS'99) drafts March 1999.

\*\* The collection of Takako Hashimoto and other: "trial productions of digest creation method in TV receiving terminal" ADBS99 drafts December 1999.

\*\* Yukari Shirata and other: "examination about digest explanatory note generation system" Information Processing Society of Japan DBS study group 120-January 2000 [ 15 or ] Kobe.

[0005]

[Problem(s) to be Solved by the Invention] However according to the above-mentioned conventional art the fragmentary information explaining the contents of

the image scene from the image added as an index picture. The target image of what can create the digest image of an important image scene semantically using an index picture in this case. Like a baseball image, there was a problem that the whole image could not necessarily create a digest image exactly about a structurally ambiguous image for a structurally clear image in the whole image comparatively.

[0006] Here a structurally clear image is easy to rule-ize beforehand the conditions for structurizing an inning and the image of an at-bat etc. and to structurize the advance (flow of an image) of a game itself like a baseball image. The image which can add the index (structure index) showing structure mechanically is shown and with a structurally ambiguous image. Since there are few conditions for structurizing an image like a soccer image and the change of offense and defense is not clear, adding mechanically the index (structure index) with which the judgment of structure is difficult and expresses structure shows a difficult image.

[0007] By applying time and a help, adding a fragmentary index picture exactly or increasing the amount of information which an index picture has further and enriching index systems also in the case of a structurally ambiguous image. Although a digest image can be exactly created now using the index systems concerned in order to add an index picture in this case, there was a fault that time and cost and a help started. It was not able to apply when an image was distributed to real time like a sport video image. When putting in another way, the art which creates a digest image from the structurally ambiguous sport video image distributed to real time was not provided.

[0008] This invention was made in view of the above and is \*\*\*\*. The purpose is to provide the sport video image digest preparation method which extracts an image scene with high importance from an ambiguous sport video image and can create a digest image.

[0009] This invention was made in view of the above and is \*\*\*\*. The purpose is to extract an image scene with high importance and to be able to create a digest image even when the fragmentary index picture is added to the ambiguous sport video image on the level which can perform real time distribution.

[0010]

[Means for Solving the Problem] In order to attain the above-mentioned purpose, a sport video image digest preparation method concerning claim 1. From a sport video image added as an index picture, fragmentary information explaining the contents of the image scene. In a sport video image digest preparation method which creates a digest image of an important image scene semantically using said index picture. The 1st index of operation that is the information which shows operation which serves as a pause of an image scene in operation of the target sport as an index picture to said sport video image. The 2nd index of operation that is the information which shows operation of each team or a player who is performing attack operation in operation of the target sport. The 3rd index of operation that is the information

which shows operation which is directly related to a score of the target sport is added at least -- further -- the [ said 1st / the / - ] -- an index of three of operation having the area information which divided into two or more area area where the target sport is performed as information which shows an applicable place at and defined it -- the [ said 1st / the / - ] -- importance of an image scene in said sport video image using an index of three of operation [ judge and ] An image scene with high importance is extracted and it creates as a digest image.

[0011] A sport video image digest preparation method concerning claim 2 in the sport video image digest preparation method according to claim 1 -- the [ said 1st / the / - ] when judging importance of an image scene in said sport video image using an index of three of operation Said 1st index of operation and the 3rd index of operation are used The section between the 1st index of operation added to said sport video image is defined as the play section (D) using said 1st index of operation A value of "1" is set up when one team is performing attack operation in said play section (D) When a team of another side of another side is performing attack operation define a team coefficient (T) as setting up a value of "0" and each area in in said play section (D) is pinpointed using said area information With reference to a weighting factor (AP) beforehand set as each area it asks for a situation level parameter (Ps) with a following formula as an integral value of time when one team is performing attack operation A value of said situation level parameter (Ps) for every  $Ps = \int_0^T (AP) dt$  play section is compared and importance of an image scene is judged per play section.

[0012] A sport video image digest preparation method concerning claim 3 In the sport video image digest preparation method according to claim 2 as a situation index which shows a situation of a game based on a value of said situation level parameter On the other hand and the 1st situation index that shows an attack of a team of another side the 2nd situation index that reaches on the other hand and shows time earnings of a team of another side An attack of the 3rd situation index that shows intense offense and defense or both teams generates the 4th situation index that shows feeling-of-tension rarefaction with a low and adds it to an image scene of the applicable play section.

[0013] A sport video image digest preparation method concerning claim 4 In the sport video image digest preparation method according to claim 3 further beforehand -- the [ said 1st / the / - ] -- the [ a situation index of four said 1st / the / - ] -- combining an index of three of operation Three kinds of importance judging parameters an attack level an agitation level and a user profile level are defined the [ the 1st added to each play section - ] -- the [ a situation index of four and the 1st - ] -- based on an index of three of operation A value of three kinds of said importance judging parameters is calculated and when extracting an image scene with said high importance and creating as a digest image an image scene is extracted focusing on an expensive portion of said importance judging parameter.

[0014] A sport video image digest preparation method concerning claim 5 In the sport video image digest preparation method according to claim 3 or 4 When

extracting an image scene with said high importance and creating as a digest image. When said situation index is added to the play section where importance is high, an image scene which consists of continuation of the play section when the same situation index is added is extracted including the high play section of said importance.

[0015] A sport video image digest preparation method concerning claim 6 in the sport video image digest preparation method according to claim 1 -- the [ said 1st / the / - ] when judging importance of an image scene in said sport video image using an index of three of operation. Said 1st index of operation and the 3rd index of operation are used. The section between the 1st index of operation added to said sport video image or the section between the 1st index of operation and the 3rd index of operation is defined as the play section. The [ the 1st within said play section - ] -- the section between the 1st index of operation added to said play section using an index of three of operation and the 2nd index of operation. The section between the 2nd index of operation or the section between the 2nd index of operation and the 3rd index of operation is defined as the attack section. The [ the 1st which computes time (t) when each team is performing attack operation for said every attack section and defines each attack section using said area information - ] -- area is shown by an index of three of operation [ pinpoint and ]. With reference to a weighting factor beforehand set as each area's weighting factor (AP) of each index of operation is determined. It asks for an attack situation level parameter (Ps) of each attack section with a following formula by making into a start index and an end index, an index of both ends which define said attack section of operation respectively. [Equation 4]

A value of said attack situation level parameter (Ps) of each attack section is compared and importance of an image scene is judged per attack section.

[0016] A sport video image digest preparation method concerning claim 7 in the sport video image digest preparation method according to claim 1 to carry out the [ said 1st / the / - ] when judging importance of an image scene in said sport video image using an index of three of operation. Said 1st index of operation and the 3rd index of operation are used. The section between the 1st index of operation added to said sport video image or the section between the 1st index of operation and the 3rd index of operation is defined as the play section. The [ the 1st within said play section - ] -- the section between the 1st index of operation added to said play section using an index of three of operation and the 2nd index of operation. The section between the 2nd index of operation or the section between the 2nd index of operation and the 3rd index of operation is defined as the attack section. The [ the 1st which computes time (t) when each team is performing attack operation for said every attack section and defines each attack section using said area information - ] -- area is shown by an index of three of operation [ pinpoint and ]. With reference to a weighting factor beforehand set as each area's weighting factor (AP) of each index of operation is determined. It asks for an attack move



level parameter (Pb) of each attack section with a following formula by making into a start index and an end index an index of both ends which define said attack section of operation respectively [Equation 5]

A value of said attack move level parameter (Pb) of each attack section is compared and importance of an image scene is judged per attack section.

[0017] A sport video image digest preparation method concerning claim 8 In the sport video image digest preparation method according to claim 1 to carry out the [said 1st / the / -] when judging importance of an image scene in said sport video image using an index of three of operation Said 1st index of operation and the 3rd index of operation are used The section between the 1st index of operation added to said sport video image or the section between the 1st index of operation and the 3rd index of operation is defined as the play section the [the 1st within said play section -] -- the section between the 1st index of operation added to said play section using an index of three of operation and the 2nd index of operation. The section between the 2nd index of operation or the section between the 2nd index of operation and the 3rd index of operation is defined as the attack section the [the 1st which computes time (t) when each team is performing attack operation for said every attack section and defines each attack section using said area information -] -- area is shown by an index of three of operation [pinpoint and] With reference to a weighting factor beforehand set as each area a weighting factor (AP) of each index of operation is determined It asks for an attack situation level parameter (Ps) of each attack section and an attack move level parameter (Pb) of each attack section with a following formula by making into a start index and an end index an index of both ends which define said attack section of operation respectively [Equation 6]

Importance of an image scene is judged per attack section using said attack situation level parameter (Ps) of each attack section and an attack move level parameter (Pb).

[0018] A recording medium concerning claim 9 in which computer reading is possible records a program for making a computer perform a sport video image digest preparation method of any one statement of said claim 1-8.

[0019]

[Embodiment of the Invention] Hereafter with reference to an attached drawing it explains in detail in order of (Embodiment 1) and (Embodiment 2) by making into an example the case where the sport video image digest preparation method of this invention is applied to a digest preparation device.

[0020] (Embodiment 1) About the digest preparation device which applied the sport video image digest preparation method of Embodiment 1. (1) As a structurally ambiguous sport video image. It explains in order of the judgment (8) example of the fundamental (4) index picture play sections (5) UNDO index (6) situation index

(7) important scene used by the composition (3) embodiment 1 of (2) digest preparation device about a \*\* soccer image.

[0021](1) About the soccer image as a structurally ambiguous sport video image Embodiment 1 explains a soccer image as an example as a structurally ambiguous sport video image. As compared with a structurally clear baseball image, digest creation is difficult for a soccer image. The reason is based on the following features of a soccer image.

\*\* Structure is not clear. Therefore addition of the index which shows structure is difficult.

\*\* There is little coded data which shows the kind and the contents of a game of the index and it cannot compute importance of an image scene easily (the index which shows the importance of an image scene is hereafter called an importance judging parameter).

\*\* A motion is intense and there are many cooperative motions. Therefore the image of a close-up increases that it is hard to follow deployment of a game with a camera and complete grasp of a play and contents distinction become difficult.

[0022] The feature and problem of such a soccer image (structurally ambiguous sport video image) are explained. First the feature that the structure of \*\* is not clear can add mechanically the index with which a baseball image expresses structure such as an inning and an at-bat and to the ability to structure automatically since a soccer image is not clear in the change of offense and defense it means being hard to structure. In the case of a soccer image the tendency for the index addition which shows structure to become subjective is strong as a result. Since the judgment of structure is difficult the hand return of adding an index also increases returning an image and checking again.

[0023] \*\* If calculation of an importance judging parameter is considered as compared with a baseball image the baseball can imagine the contents of the game from a scorebook. By these people using the already proposed art In the case of a baseball image. It is possible to compute an importance judging parameter by there being many coded data which can be expressed with the numerical value of fixed range such as score information SBO (strike ball out) information advance-to-the-next-base information and combining with the image index information which added them mechanically. For example when the attack level which expresses offensive importance as one of the importance judging parameters is defined this attack level The calculation rule of an attack level (importance judging parameter) can be defined as offensive index such as a hit a home run getting to the first base and addition of points briefly based on score information etc.

[0024] On the other hand since there is little coded data used as an objective indicator in the case of a soccer image and it has it as for repair of an index it is hard to compute an importance judging parameter. [ little ] For example it is a shot and the goal which can be mechanically added as an offensive index and it is score information and a hour entry grade which can be used as objective coded data. Now the calculation rule of an attack level (importance judging parameter) becomes simple the digest image by which only the scene which is shooting was started is

created and the contents of the game cannot be expressed exactly.

[0025]\*\* Although based on the character of the soccer itself since there is a cooperation path play with a soccer image it becomes difficult to grasp a player's role more compared with a baseball image. In particular with a soccer image since the image of a close-up increases or since other players' play is copied it becomes difficult to always identify a player and there is difficulty by the ability not to see other portions of a cooperation play. Even if it is able to see all the players' motion nearby in order to distinguish the importance of the play and to add an index Discernment capability is needed and since the degree for which evaluation of the contents of the play depends on a judgment person becomes large it becomes difficult to perform a uniform judgment (difficulty of contents distinction).

[0026] For such a reason creation of index systems and index addition become difficult with a soccer image (structurally ambiguous sport video image). For example a case like the attack scene of soccer where a mass of flow is semantically started as a digest image is considered. The flow of soccer of an attack -- the cut of a path takes place frequently in the middle of a flow -- is dramatically dynamic. Since the index maker cannot read the future many cancellation of index addition and work of extension of term and reattaching generate him in the middle. When distributing to real time this serves as still more difficult work. Although index distribution may be carried out to real time to a soccer image since an index maker may do UNDO (invalid) after \*\*he needs to add and distribute an index real time.

[0027] It is possible to compute an importance judging parameter only for the fragmentary index information data which show certain one on an image and structure information in the case of a baseball image. On the other hand structure is not clear and an importance judging parameter cannot be computed from shortage of index information data and shortage of structure information on the quick soccer image of deployment.

[0028] So at Embodiment 1 when judging the importance of the image scene in a soccer image (structurally ambiguous sport video image) an importance judging parameter is not computed only for fragmentary index information data and structure information. It asks for the auxiliary parameter (situation level parameter) with which the situation on an image is expressed from fragmentary index information data. Combining this situation level parameter and fragmentary index information data an importance judging parameter is computed and the sport video image digest preparation method which creates a digest image is proposed.

[0029] (2) The lineblock diagram 1 of a digest preparation device shows the outline composition of the digest preparation device of Embodiment 1. The figure (a) shows the general-view figure of the digest preparation device 100 and the figure (b) shows hard structure. As hard structure of the digest preparation device 100 CPU 101 which performs processing based on the software mentioned later and ROM 102 which memorized the boot program etc. RAM 103 used as a work area of CPU 101 and the keyboard 104 and the mouse 105 for performing various kinds of alter operation. The displays 106 with the display screen for displaying a sport video

imagesuch as CRT and a liquid crystal displayThe hard disk 108 which memorized the various application programs and data of the digest creation software 107 grade for realizing the sport video image digest preparation method of Embodiment 1It has at least the interface parts 109such as various drivers for connecting with an external instrumentand a network adaptorand the bus 110 which connects each part of the above.

[0030](3) According to the fundamental index picture embodiment 1 used by Embodiment 1it has a structure index and an index of operation as a fundamental index picture added to a sport video image. abstract indexes (index which has the information which is not fragmentary)such as a situation index mentioned later-- a basis [ index / a structure index or / of operation ] -- a definition -- nowit is.

[0031]\*\* Structure-index structure indices are a kickoff a no sideand an index that shows the structure of gamessuch as an endin the first half in the second half of /. Howeversince there are few kinds compared with a structural sport video image (baseball image)a structure index alone will not enable you to structurize in detail.

[0032]\*\* It is an index which shows operation (if it puts in another way attack operation) of the player who holds the ball in an index soccer image of operationand is classified into the following three indexes.

1) Pause index: A throw-ina free kicka corner kicka goal kickfouletc. are the indexes of operation for creating a pause of an image scene at the play called a set play. If it puts in another wayit is an index which shows the operation which serves as a pause of an image scene in operation of the target sportand is equivalent to the 1st index of this invention of operation.

[0033]2) ball possession index: It is an index which carries out path appearance and shows who has a ball by operation of a path receptaclea cutetc. carrying out path appearance from a path receptaclewhen a player with a ball changes -- etc. - - when operation changesit generates. generallysince it is very shortpath appearance of the time in a path receptacle to path appearance stripes is usually carried outand it is only operation and let it be a path receptacle and a thing which carries out path appearance and shows operation. Suppose that dribble operation is happened from the path receptacle at the time in path appearance stripes in Embodiment 1. That isthis ball possession index is information which shows operation of each team or player who is performing attack operation in operation of the target sportand is equivalent to the 2nd index of this invention of operation.

[0034]3) A shot and goal index: The index generated when a ball is turned to the goal and kicked is a shot indexand it will become a goal index if a shot is successful. If it puts in another wayit is the information which shows operation which is directly related to the score of the target sportand is equivalent to the 3rd index of this invention of operation.

[0035]4) UNDO index: It is an index for setting to UNDO (invalid) other indexes of operation added immediately before.

[0036]The position (the area information mentioned later shows) of player Nei and the ball at the timeetc. are set to each index of operation as attribution information if needed.

[0037]Area information is explained here. The area information which divided into two or more area the area where the target sport is performed as information (it is in agreement with the position of a ball with a soccer image) which shows the applicable place atand defined it is set to each index of operation.

[0038]As shown in drawing 2to the waging-war team (the home team (H)away team (A))the area information (position of a ball) of Embodiment 1 divided the ground into the area of 10 roughlyand set up the sign (area name) as area information. it will be alike and the area name of HG and H1-H4 which are shown in drawing 2CA1 - A4and AG will carry out a flip horizontalif defensive positioning changes in the first half and the second half. The weighting factor (AP) of the area where the numerical value set as each area corresponds is expressed.

[0039]Drawing 3 shows the example of the attribute list (attribution information list) of a structure index and an index of operation. A team namea player namearea (area name)etc. are set to the attribute list. Although omitted in drawing 3the time code is set to all the indexes as an attribute.

[0040](4) Define the section divided by the pause index (1st index of operation) of the play section operation indexes as the play section. In a soccer imageonly by the section division by a structure indexsince the section is large and insufficientin judging the importance of an image scene per sectionit calculates importance using the play section. A pause indexshotand goal index (3rd index of operation) other than a pause index may be usedand the play section may be defined.

[0041](5) Explain the role of a UNDO indexnext a UNDO index. Although the index maker side attaches an index of operation to real time to the flow of the game where future deployment is not in sightthe case where the flow of a field of view must change on the wayand an index of operation must be corrected is expected. For exampleit is in the situation where everyone thinks "the forward's player released the shot"and there are many cases where not a shot but the path was sent out in fact. in such a casewhen the UNDO index was added and distributedthe UNDO index was included in the receiving terminal device side -- an index picture can be interpreted altogether and only an effective index picture can be eventually obtained as index information data. In the index maker sideif there is a time margin by distributionthe index of operation specified by the UNDO index can be deleted or correctedand the index picture after correction can be distributed.

[0042]Drawing 4 is an explanatory view showing the example which added the index picture which included the UNDO index in the soccer image. The soccer image is structurized by two scenesthe first half and the second halfwith the structure index 401. The play section 403 is defined by the pause index 402. In drawing 4after thinking that Nagai shot and adding a shot indexsince it was a paththe UNDO index 404 is added and corrected.

[0043]As shown in drawing 4only the ball possession index makes the player name the index name to most index names of operation being event names. This is because the direction which adds a ball possession index to real time succeeding the time of doing index addition work in many casesand uses a player name can

work efficiently.

[0044](6) Define a situation index as an abstract index based on a situation index next the fundamental index picture (especially index of operation) mentioned above. An abstract index is an index which shows the index or compound event which gives the significance subjectively by reference of various parameters and is carried out. Embodiment 1 defines the situation index shown below at least as a situation index which shows the situation of a game.

[0045]\* Attack of the example \*\* H/A team of a situation index: It is in the home team's attack or the attack state of an away team. That is it is equivalent to the 1st situation index of this invention which reaches on the other hand and shows the attack of the team of another side.

\*\* working the time of a H/A team : on the other hand -- and it is equivalent to the 2nd situation index of this invention which shows time earnings of the team of another side.

\*\* Intense offense and defense: It is equivalent to the 3rd situation index of this invention which shows intense offense and defense.

\*\* Feeling-of-tension rarefaction: The attack of both teams is equivalent to the 4th situation index of this invention which shows feeling-of-tension rarefaction with a low.

[0046] This situation index is set up based on an importance judging parameter called the situation level parameter (Ps) computed by a following formula.

$$Ps = \int_0^T (AP) dt$$
 however D: play section T: The value which shows the team holding a ball. It is set to "0" when the self-team holds and "1" and an opponent team hold.

AP: Dignity which was defined to each area and which is (weighting factor)

A weighting factor becomes large and when it is in the area of a self-team it serves as a value of minus so that it becomes close to a partner's goalmouth (goal gate) as drawing 2 showed.

[0047] A situation level parameter (Ps) is calculated to each team for every play section. If the play section is integrated only with a T value it will become the ball possession time of the team. Weighting of it is carried out for every area.

[0048] Here the approximation calculation of the integral value of the time when one team is performing attack operation is explained. In the applicable play section the value which applied the time interval to the value of T-AP at that time whenever there was an index of operation is added. A time interval borders on the time halfway point with index generating [ in front and behind ] of operation. A T-AP value is set constant from this boundary up to a boundary. Then let total of the rectangle area of various time length who was able to do it be an integral value.

[0049] Next the example which defines a situation index (abstract index) is shown below using the above-mentioned situation level parameter. Here a name called Ps (H/A) and prevPs (H/A) is referring the play section value in front of Ps of a H/A team and each one. A "play" expresses the play section.

[0050]

[0051]In the above-mentioned definition the reason for having used the difference of Ps and prevPs is for expressing the migration length to the goal so that a ball may be dribbled at quick speed in a partner's position from the members of \*\*.

[0052]

It works the time of <ABSINDEX>H team. <CLASS> play </CLASS> <PATTERN> (residual time (play start) <=5min of a game)

(score(H) >=score (A)) & //. It won. &(play section length >=1min)//which is not touching a ball with &(Ps (A) =0)// partner Redundant </PATTERN> <KEY> play start </KEY> <ADD> play start </KEY> </ABSINDEX>[0053]

<ABSINDEX> Intense offense and defense <CLASS> play [6] </CLASS>

<PATTERN> (plaucount (HPs (H) >alpha) >=2)

& (plaucount (APs (A) >alpha) >=2)

</PATTERN> <KEY> play [0] </KEY> <ADD> play [\*] Start </ADD> It adds to

the play of//all. </ABSINDEX>[0054]The definition of intense offense and defense is explained. In the case of intense offense and defense pause operation appears in fixed time repeatedly and it is assumed that the play section becomes short.

Then the case where both teams had two or more cases where Ps is high was defined as the intense offensive and defensive period in six continuous play intervals.

[0055]

[0056]It is defined as the play section of feeling-of-tension rarefaction with the time when the situation level parameter of both teams is low.

[0057](7) Explain the decision processing of an important scene (image scene with high importance) of the creation sake of the digest image over the soccer image which are the judgment of an important scene next an important section of this invention.

[0058]The plan of a judgment of the important scene in Embodiment 1 is as follows.

(A) Define and calculate an importance judging parameter (three kinds an attack level an agitation level and a user profile level) combining a situation index and an index of operation. And an image is searched focusing on the expensive portion of an importance judging parameter.

(B) The most important scene is a shot scene with a soccer image. On the occasion of section extraction of a shot scene the moment that not only a shot scene but an attack is started is chosen and it is made to become a suitable scene following it.

[0059]The importance judging parameter of a soccer image is defined as follows.

<PARAMETER> attack level <CLASS. > play </CLASS> <RULE> shot +=3:goal +=4: Cut +=1: Offensive +=2 of the offensive +=2:A team of H team: Initiative +=2: Tie tau +=2:inversion +=2 </RULE> </PARAMETER>[0060]With an agitation level if

a principle and one of teams have an expensive attack level it will become high. In

addition it is made to become high when a path turns to a prominent player. A user profile level becomes high on the appearance of a team and a player or activity scene aided based on individual taste information.

[0061] Next the section extracting processing of an important scene is described. The following algorithms perform section extraction.

- \*\* The longest of each digest scene is set up beforehand. This is called the maximum scene length. Fundamentally by maximum scene Osa nai it starts so that scene length may become long as much as possible.

- \*\* If the situation index "intense offense and defense" is set as the extracted play section order will be searched and the row of the continuous play section will be chosen. Let that row be one digest scene (this processing enables it to extract an important scene tracing back to the start of the offensive and defensive scene before the goal).

- \*\* When the extracted scene is longer than the maximum scene length confirm whether there is any scene which carried out the ball cut in the middle of within the section. When you are let the place be a starting position of a scene.

- \*\* When a scene is longer than the maximum scene length still shift the position of a scene start back in time so that it may become the maximum scene length.

[0062] (8) Based on the composition and operation which carried out the example above-mentioned the digest image was created from the soccer image. xxxx on September 6 1999 "xxxxxxx pair xxxxx game" was used for experimental data. \*\* and drawing 6 show the situation of change of an attack level (importance judging parameter) PARETA value for the situation of change of situation level parameter value [ in / in drawing 5 / the game first portion ].

[0063] At first it is a pace of xxxxx and there is a score of xxxxx at the beginning the first half of this game. It becomes in the end of the first half and becomes a xxxxxxx pace at last and a score occurs in xxxxxxx just before an end in the first half.

[0064] As shown in drawing 5 the situation level parameter of xxxxx and xxxxxxx was fluctuated in accordance with the flow of a actual game and it has verified that the flow of this game was shown surely.

[0065] The image scene of the portion shown by blow off in drawing 6 makes maximum length of a logging scene 20 seconds and the result judged by the method of (A) and (B) shown by the judgment of the above-mentioned important scene is shown.

[0066] Thus an image scene with high importance can be extracted from a structurally ambiguous sport video image (soccer image). Therefore the digest image which extracted the image scene with high importance can be created.

[0067] As mentioned above even when the fragmentary index picture is added to the structurally ambiguous sport video image (soccer image) on the level which can perform real time distribution an image scene with high importance can be extracted and a digest image can be created.

[0068] (Embodiment 2) Fundamentally in the same composition and operation as Embodiment 1 the sport video image digest preparation method of Embodiment 2



divides the play section further defines the attack section and judges the importance of an image scene per this attack section.

[0069] Embodiment 2 -- the [ the 1st - ] when judging the importance of the image scene in a sport video image using the index of three of operation. The section between the 1st index of operation added to the sport video image or the section between the 1st index of operation and the 3rd index of operation is defined as the play section using the 1st index of operation and the 3rd index of operation. The [ the 1st within the play section - ] -- the section between the 1st index of operation added to the play section using the index of three of operation and the 2nd index of operation. The section between the 2nd index of operation or the section between the 2nd index of operation and the 3rd index of operation is defined as the attack section. The [ the 1st which computes the time (t) when each team is performing attack operation for every attack section and defines each attack section using area information - ] -- the area in shown by the index of three of operation [ pinpoint and ] With reference to the weighting factor beforehand set as each area determine the weighting factor (AP) of each index of operation and the index of the both ends which define the attack section of operation is made into a start index and an end index respectively. It asks for the attack situation level parameter (Ps) of each attack section and the attack move level parameter (Pb) of each attack section by several 7 formula. The importance of an image scene is judged per attack section using the attack situation level parameter (Ps) of each attack section and an attack move level parameter (Pb).

[0070]

[Equation 7]

[0071] The attack situation level parameter (Ps) and the attack move level parameter (Pb) are defined as follows respectively.

[0072]

<PARAMETER>Ps(\$x)

<CLASS> attack </CLASS> <RULE> operation index [Team name =\$x]

+ = (/(weight(team name and area)+weight (team name and area<sub>1</sub>)) 2 x (time code<sub>1</sub>-time code))

</RULE> </PARAMETER> [0073]

<PARAMETER>Pb(\$x)

<CLASS> attack </CLASS> <RULE> operation index [Team name =\$x]

= (weight(team name and area<sub>1</sub>) - weight (a team name and area)) (/2 /(time code<sub>1</sub>-time code))

</RULE> </PARAMETER> [0074] Drawing 7 is an explanatory view showing area information of Embodiment 2. Drawing 8 is an explanatory view showing relation between the play section and the attack section. Drawing 9 is an explanatory view showing example computation of a ball possession level parameter in Embodiment 2. Drawing 10 is an explanatory view showing example computation of a ball move level parameter which Embodiment 2 can set. Drawing 11 is an explanatory view

showing example computation of an attack level parameter in Embodiment 2.

[0075]Also in a sport video image digest preparation method of Embodiment 2 the same effect as Embodiment 1 can be done so.

[0076]A sport video image digest preparation method concerning this invention explained above is realized by executing a program by computer beforehand according to a procedure shown in explanation and each algorithm of Embodiments 1 and 2 which were mentioned above. This program is recorded on a recording medium which can be read by computers such as a hard disk, a floppy (registered trademark) disk, CD-ROM, and DVD, and is executed by being read from a recording medium by computer. This program can be distributed via a network via the above-mentioned recording medium.

[0077]

[Effect of the Invention]As explained above according to the sport video image digest preparation method of this invention. The 1st index of operation that is the information which shows the operation which serves as a pause of an image scene in operation of the target sport as an index picture to a sport video image. The 2nd index of operation that is the information which shows operation of each team or player who is performing attack operation in operation of the target sport. The 3rd index of operation that is the information which shows operation which is directly related to the score of the target sport is added at least -- the [ the further 1st -- ] -- the index of three of operation. It has the area information which is divided into two or more areas: the area where the target sport is performed as information which shows the applicable place and is defined in the [ the 1st -- ] -- since the importance of the image scene in a sport video image is judged using the index of three of operation, an image scene with high importance is extracted and it creates as a digest image; an image scene with high importance is extracted from a structurally ambiguous sport video image and a digest image can be created. Even when the fragmentary index picture is added to the structurally ambiguous sport video image on the level which can perform real time distribution, an image scene with high importance is extracted and a digest image can be created.

[0078]The recording medium (claim 9) which can be read by computer. This invention: Since the program for making a computer perform the sport video image digest preparation method of any one statement of claim 1-8 was recorded. By reading and executing this program by computer, an image scene with high importance is extracted from a structurally ambiguous sport video image and a digest image can be created. Even when the fragmentary index picture is added to the structurally ambiguous sport video image on the level which can perform real time distribution, an image scene with high importance is extracted and a digest image can be created.

---

## DESCRIPTION OF DRAWINGS

---

[Brief Description of the Drawings]

[Drawing 1] It is an outline lineblock diagram of the digest preparation device which applied the sport video image digest preparation method of Embodiment 1.

[Drawing 2] It is an explanatory view showing the area information of Embodiment 1.

[Drawing 3] It is an explanatory view showing the example of the attribute list of a structure index and an index of operation.

[Drawing 4] It is an explanatory view showing the example which added the index picture which included the UNDO index in the soccer image.

[Drawing 5] It is an explanatory view showing the situation of change of the situation level parameter value in the game first portion of the experimental data (EXAMPLE) based on Embodiment 1.

[Drawing 6] It is an explanatory view showing the situation of the attack level (importance judging parameter) PARETA value change of experimental data (EXAMPLE) based on Embodiment 1.

[Drawing 7] It is an explanatory view showing the area information of Embodiment 2.

[Drawing 8] It is an explanatory view showing the relation between the play section and the attack section.

[Drawing 9] It is an explanatory view showing the example computation of the ball possession level parameter in Embodiment 2.

[Drawing 10] It is an explanatory view showing the example computation of the ball move level parameter which Embodiment 2 can set.

[Drawing 11] It is an explanatory view showing the example computation of the attack level parameter in Embodiment 2.

[Description of Notations]

100 Digest preparation device

---